Upon the Extent of the Expansion and Contraction of Timber in different directions relative to the Position of the Medulla of the Tree. By Thomas Andrew Knight, *Esq. F.R.S. In a Letter addressed to the Right Hon. Sir* Joseph Banks, *Bart. G.C.B. P.R.S.* Read May 8, 1817. [*Phil. Trans.* 1817, *p.* 269.]

Most of the attempts which have been made by writers on vegetable physiology, to account for the force with which the sap of trees ascends during the spring, having proved unsatisfactory and inadequate, Mr. Knight was induced some years ago to suggest the expansion and contraction of the cellular processes proceeding from the bark to the medulla, and which he called the true or silver grain of the wood, as concerned in this process.

The present paper contains further experiments, showing this power to be active in living trees, and were made on many kinds of timber with nearly similar results. Some boards of ash and beech wood were cut in opposite directions relative to their medulla, so that the convergent cellular processes crossed the surfaces of some of them at right angles, and were parallel with the surfaces of others. These were placed, under similar circumstances, in a warm room, and the former warped about ten times more than the latter, contracting nearly 14 per cent. in breadth, while the others only contracted $3\frac{1}{2}$ per cent. During his experiment Mr. Knight was led to infer that the medullary canal must be liable to considerable changes of diameter, as the moisture of wood increases or diminishes. To ascertain this, parts of the stems of young trees were carefully dried, the medulla was removed, and metal cylinders driven with force into the empty space. The pieces of wood were then suffered to absorb moisture, and the medullary canal became so much enlarged as to suffer the cylinders to fall out.

Mr. Knight conceives that this kind of expansion often produces those rifts in trees referred to wind or frost. That winds cannot be the cause, seems obvious from the circumstance of pollard-oak-trees being almost always rifted, upon which they can have little power; and the frost of this climate is seldom sufficiently intense to congeal the winter sap in trees.

The force with which this cellular substance of timber expands, is more than adequate to such effects, and often overcomes a pressure of many tons; and as it is in action in the living tree, Mr. Knight is of opinion that it is the agent by which the powerful propulsion of the sap observed by Hales is effected.

Observations on the Temperature of the Ocean and Atmosphere, and on the Density of Sea-water, made during a Voyage to Ceylon. In a Letter to Sir Humphry Davy, *LL.D. F.R.S. By* John Davy, *M.D. F.R.S.* Read May 22, 1817. [*Phil. Trans.* 1817, *p.* 275.]

The experiments on the specific gravity of sea-water, detailed in this paper, were partly conducted at sea, and partly after the author's